1 INTRODUCTION

"Jealous stepmother and sisters; magical aid by a beast; a marriage won by gifts magically provided; a bird revealing a secret; a recognition by aid of a ring; or show; or what not; a dénouement of punishment; a happy marriage - all those things, which in sequence, make up Cinderella, may and do occur in an incalculable number of other combinations. "

— MR. Cox ***1893***, *Cinderella: Three hundred and forty-five variants [**?**]*

cd

TODO Recent papers first. Mention Workshops instead in conference. "Procedings of XXXX". Add the pages in the papers list.

1.1 Background

TODO Motivate with the open challenges.

1.2 Problem statement

TODO Problem statement **TODO** Set the requirements as R1, R2, then map each contribution to them.

1.3 Automatic Software diversification requirements

1. **1:** **TODO** Requirement 1

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Contribution	Research papers				
	P1	P2	P3	P4	P5
C1 Experimental contribution	✓	✓	✓	✓	✓
C2 Theoretical contribution	✓	✓		✓	
C3 Diversity generation		✓	✓	✓	✓
C4 Defensive diversification		✓	✓	✓	
C5 Offensive diversification					✓
C6 Software artifacts	✓	✓	✓	✓	✓

Table 1.1

1.4 List of contributions

C1 Experimental contribution: We propose reproducible methodology for generating software diversification for WebAssembly, the assessment of the generated diversity and the exploitation of the generated variants.

C2 Theoretical contribution: We propose a theoretical foundation in order to improve Software Diversification for WebAssembly.

C3 Diversity generation: We generate WebAssembly program variants.

C4 Defensive Diversification: We assess how generated WebAssembly program variants could be used for defensive purposes.

C5 Offensive Diversification: We assess how generated WebAssembly program variants could be used for offensive purposes, yet improving security systems.

C6 Software Artifacts: We provide software artifacts for the research community to reproduce our results.

1.5 Summary of research papers

This compilation thesis comprises the following research papers.

P1: **Superoptimization of WebAssembly Bytecode.**
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P2: **CROW: Code randomization for WebAssembly bytecode.**
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P3: **Multivariant execution at the Edge.**
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P4: **Wasm-mutate: Fast and efficient software diversification for WebAssembly.**
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P5: **WebAssembly Diversification for Malware evasion.**
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Thesis layout

This dissertation comprises two parts as a compilation thesis. Part one summarises the research papers included within, which is partially rooted in the author's licentiate thesis [**?**]. Chapter 2 offers a background on WebAssembly and the latest advancements in Software Diversification. Chapter 3 delves into our technical contributions. Chapter 4 exhibits two use cases applying our technical contributions. Chapter 5 concludes the thesis and outlines future research directions. The second part of this thesis incorporates all the papers discussed in part one.